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40 CFR Part 82

Protection of Stratospheric Ozone; Advance Notice of Proposed Rulemaking

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 82

[FRL-3426-2]

Protection of Stratospheric Ozone

AGENCY: Environmental Protection Agency.

ACTION: Advance Notice of Proposed Rulemaking (ANPRM).

SUMMARY: EPA is considering further rulemaking on several issues related to its efforts to protect stratospheric ozone. In a separate notice published in today's **Federal Register**, the Agency issued final rules implementing the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol). In the context of that rulemaking, four issues were raised and action on them deferred pending additional public comment and review.

In the Preamble to its final rule, EPA briefly described new scientific information related to global ozone trends and seasonal losses in Antarctica. This ANPRM explains in greater detail the nature of that information.

EPA's final rule implements the Protocol through a system of allocated production and consumption allowances. EPA adopted this approach because, on balance, it appeared to be the most effective means of limiting ozone-depleting substances consistent with the Montreal Protocol. However, as explained in the preamble to the final rule, EPA is concerned about two unintended adverse consequences that might result from implementation of the rule.

By allocating allowances to the seven domestic producers of CFCs and halons, and by restricting future supply of these chemicals, EPA's regulation could result in sizable windfalls accruing to these producers. The existence of these windfalls could create an economic incentive for producers to delay the introduction of chemical substitutes which could have adverse economic and potential environmental consequences. EPA is seeking comment on the appropriateness and structure of supplementing its allocated quota system with a regulatory fee to remove any unintended incentives. Alternatively, the Agency is also seeking comment on the desirability of shifting from the allocated quota system promulgated today to an auction system.

While the theory behind the allocated quota system is that the marketplace, through price increases, will provide adequate incentive for firms to reduce their use of the regulated chemicals, EPA is concerned that some industries, particularly those in which CFCs and halons are a small part of the price of final goods, may be slow to respond to market-driven price increases and may not shift away from these chemicals as soon as it becomes cost-effective to do so. The effect of any such delays would be to substantially increase CFC and halon prices to all firms, to increase the total costs to society of meeting the Protocol's control requirements, and to increase windfalls to producers. EPA is seeking comment on industry-specific control requirements as a supplement to allocated quotas that, under certain circumstances, it might promulgate to ensure that needed reduction in the use of CFCs and halons are adopted as soon as these reductions are cost-effective.

DATE: Written comments on the ANPRM must be submitted by November 1, 1988, to the location listed below.

ADDRESSES: Written comments should be sent to Docket A–88–27, Central Docket Section, South Conference Room 4, Environmental Protection Agency, 401 M Street SW., Washington, DC 20460. The docket may be inspected between 8 a.m. and 3:30 p.m. on weekdays. As provided in CFR Part 2, a reasonable fee may be charged for photocopying. To expedite review, it is also requested that a duplicate copy of written comments be sent to Stephen R. Seidel at the address listed below.

FOR FURTHER INFORMATION CONTACT: Stephen R. Seidel, Senior Analyst, Office of Program Development, Office of Air and Radiation (ANR–445), EPA, 401 M Street SW., Washington, DC 20460. Telephone (202) 382–2787.

SUPPLEMENTARY INFORMATION:

I. Background

The threat of depletion of the ozone layer from chlorofluorocarbons (CFCs) was first raised well over a decade ago by the scientific community (Molina and Rowland, 1974). The initial theory suggested that because CFCs are relatively inert, emissions of these chemicals would not break down in the lower atmosphere, but would instead slowly migrate to the stratosphere where they would then break apart releasing chlorine. Once freed in the stratosphere, the chlorine would catalytically destroy ozone. From a health and environmental perspective, depletion of the earth's ozone layer would allow more harmful ultraviolet radiation to penetrate the atmosphere and strike the earth's surface which would increase the incidence of certain skin cancers and cataracts, suppress the human immune system, damage crops and aquatic organisms, accelerate weathering of certain plastics, and increase formation of ground-level ozone (smog).

In the fourteen years of research since the original theory was proposed considerable scientific evidence has supported the general concern that increased emissions of CFCs (and halons) would lead to ozone depletion. (See, for example, Atmospheric Ozone, 1985 (WMO, 1986)).

In response to the growing scientific consensus, the United Nations Environment Program (UNEP) began negotiations in 1981 in an effort to develop a multilateral response to reducing the threat of ozone depletion. These negotiations resulted in the Vienna Convention for the Protection of the Ozone Layer in March 1985 which provides a framework for international cooperation in research, monitoring, and information exchange. Further negotiations resulted in the Montreal Protocol on Substances that Deplete the Ozone Layer which was signed in September 1987 and which requires Parties to reduce their use of specified ozone-depleting chemicals. The terms of the Montreal Protocol are discussed in detail in an earlier **Federal Register** notice (December 14, 1987; 52 FR 47489).

EPA's final rule implementing the Montreal Protocol is published elsewhere in today's **Federal Register**. The notice accompanying that rule summarizes the scientific, economic, technical, and legal bases for the Agency's action. It also describes the allocated quota system employed by EPA to achieve the Protocol's control refinements.

While EPA believes that its final action meets its obligations under Sec. 157(b) 42 U.S.C. section 7457(b) of the Clean Air Act and the Montreal Protocol, several issues were raised during the rulemaking which EPA believes require additional review.

Specifically, new scientific information became available in summary form during the course of the rulemaking which, in part because of time constraints, could not be fully reviewed and therefore was not considered in the final rule. This ANPRM provides the public with a summary of that information. EPA intends to notify the public of the availability of the full body of the Ozone Trends Panel Report (NASA, 1988) when it becomes available and will at that time request comments on its implications for future action.

Three other issues, which relate to unintended adverse consequences of EPA's use of allocated quotas, were

raised in the public comments on the proposal and warrant additional review. EPA is seeking comment whether it should add a regulatory fee to supplement the allocated quota system. The fee would be designed to capture the windfalls which would otherwise accrue to a small number of CFC and halon producers. EPA is concerned that the existence of such windfalls would create a potential economic incentive for these chemical producers to delay the introduction of chemical substitutes. Any such delay could have adverse economic and potential environmental impacts on EPA's stratospheric protection efforts. Alternatively, EPA is also seeking comment on the desirability of shifting at some future date to an auction-based system in place of allocated quotas.

Finally, EPA is also seeking comment on the desirability of developing industry-specific engineering controls and/or use-specific bans on CFCs. These rules are being considered as an adjunct to the allocated quota system, but would be promulgated only in instances where industries were not making timely progress toward reduced use of these chemicals.

II. New Scientific Information

A. Past Treatment

As part of its December 14 proposal, EPA discussed the existing evidence concerning possible changes that have already occurred to the ozone layer (52 FR 47492). It essentially stated that, based on the major assessment issued by the World Meteorological Organization in 1986 (WMO, 1986) and EPA's own risk assessment document (EPA, 1987), no statistically significant change had occurred in global estimates of total column ozone (i.e., the amount of ozone from the earth's surface through the stratosphere in any given place).

The preamble to the December proposal went on to discuss preliminary evidence related to areas of potentially critical concern: large seasonal losses in ozone over Antarctica (the so-called Antarctic ozone hole) and preliminary reports of global ozone reductions based on both ground-based and satellite measurements. While the existence of the ozone hole had been well documented by researchers, key questions remained: was it caused by man-made chlorine; are there health and environmental effects from this regional phenomenon; and are there implications for global ozone levels? Data suggesting that ozone had depleted globally had not yet been published in the scientific literature and therefore had not yet been thoroughly reviewed. In addition to validating and quantifying the trend itself, EPA also cited the need to distinguish ozone losses related to man-made chlorine from those related to natural causes (e.g., solar cycle, volcanic activity).

EPA also raised the concern that current atmospheric models which were relied on in the Agency's risk assessment do not account for these occurrences. In both cases, EPA stated that because of insufficient information and time, it was premature to consider these issues in its assessment of risks or as part of the rulemaking. The Agency also referenced an assessment of these issues (the Ozone Trends Panel) that was in progress at the time.

B. Summary Report of the Ozone Trends Panel

Following an 18-month review involving over 100 of the world's leading atmospheric scientists, the executive summary of the Ozone Trends Panel report was released on March 15, 1988. The Panel conducted an extensive review of existing ground-based and satellite measurements and of the results from recent campaigns to Antarctica. They analyzed and sought to isolate changes in ozone levels related to natural phenomenon from those related to chlorine and also compared ozone meausrements to predictions from atmospheric models.

The executive summary contains a listing of key findings. The analysis showed "undisputed observational evidence" of increased atmospheric levels of trace gases (CFCs, carbon dioxide, methane, nitrous oxides, halons) because of human activities. Its review of global ozone trends showed a depletion of 1.7 to 3.0 percent ozone loss between 1969 and 1986 at latitudes between 30 and 64 degrees in the northern hemisphere (where measurements are the most extensive). This decrease occurs after correcting for the effects of natural variation and is more pronounced in the winter than the summer. After comparing these measurements with model calculations, the report states that "The observed changes may be due wholly, or in part, to the increased atmospheric abundance of trace gases, primarily chlorofluorocarbons (CFCs)." The Panel determined that "it was not possible to obtain a sufficiently accurate trend in total ozone using Nimbus–7 satellite data alone because the rate of degradation of the diffuser plate cannot be uniquely determined." This problem in interpreting the raw data from the satellite to correct for instrument error restricted the Panel's ability to rely on this source of information for its conclusions.

In its review of data related to Antarctic ozone, it reconfirmed that "There has been a large, sudden, and unexpected decrease in the abundance of springtime Antarctic ozone over the past decade." The 1987 data showed that the ozone hole had both deepened (i.e, greater loss of ozone) and had lasted longer than previously recorded. It also reported apparent ozone decreases since 1979 of 5 percent or more at all latitudes beyond 60 degrees south throughout the year. It concluded, "The weight of evidence strongly indicates that man-made chlorine species are primarily responsible for the observed decrease in ozone within the polar vortex."

The executive summary of the report has been added to the public docket for this rulemaking. As stated above, EPA will notify the public in a **Federal Register** notice when the full report is completed and at that time will seek public comment. The Agency intends to use this information in the coming months to update its own risk assessment and will also examine any additional scientific information (e.g. papers presented at the ozone trends conference held in May 1988 in Snowmass, Colorado) that has recently became available.

III. Combining a Regulatory Fee With Allocated Quotas

In proposing to implement the Montreal Protocol (52 FR 47489; December 14, 1987), EPA examined a range of alternative regulatory approaches including the use of traditional engineering control requirements and innovative market-based rules, and stated that "[e]ach of the options has certain advantages, but also raises possible problems" (52 FR 47500). As explained in the notice accompanying the final rule, after reviewing the public comments, EPA concluded that, on balance, the allocated quota approach is the appropriate means of implementing the Montreal Protocol. However, EPA also noted that additional regulatory steps may be required to minimize any unintended adverse impacts resulting from this approach.

One such impact is the potential for current CFC and halon producers to reap a windfall profit from the scarcity created by EPA's regulation. In its December 14 notice of proposed rulemaking (NPRM), EPA asked "whether possible profits from continued production of the restricted chemicals might have the undesired

effect of delaying the introduction of less profitable chemical substitutes" (52 FR 474507). The Agency also asked for comments on the option of combining allocated quotas with a regulatory fee.

A. Basis for Adding a Fee to Allocated Quotas

EPA received public comment on both the likelihood of sizable windfalls resulting from its allocated quota system and the potential implications for delaying the introduction of chemical substitutes. The Agency also initiated two studies (DeCanio, 1988 and Sobotka, 1988) examining these issues.

1. Likelihood and Magnitude of Windfall

In the December 14 NPRM, EPA explained why windfall profits (also termed transfer revenues) could result from its proposed allocated quota system. Essentially, the allocated quota system operates by restricting the supply of CFCs and halons. Since demand for these chemicals by user industries is expected to continue to grow (because of continued demand for products which contain them or are made with them), competition for the restricted CFC and halon supplies should result in firms paying higher prices for these chemicals. While higher prices for CFCs and halons will stimulate some firms and industries to shift to alternate materials, institute or increase recycling, or produce other products, if substitutes are not readily available, many firms will have little choice but to continue to use these chemicals while paying a higher price.

The RIA supporting the December 14 NPRM estimated windfall profits of between $2–6 billion through the end of the century depending on the rate at which firms employed low-cost control technologies (i.e. the faster controls are employed the lower the windfalls). The amount of the predicted windfall is based on the market-clearing price paid for CFCs and halons. In turn, this price results from the allowable supply of CFCs and the market demand as determined, in part, by the costs of options available to firms and consumers to reduce their use of these chemicals.

EPA has revised its preliminary RIA to include new information on control technologies and market demand for these chemicals. Its revised estimate suggests that windfalls could range from $1.8 to $7.2 billion through the turn of the century. (See chapter 9 of the RIA.)

2. Potential for Delay of Substitutes

As stated in the December 14 NPRM, EPA is concerned that the existence of large windfalls could create an economic incentive for the CFC and halon producers to delay the introduction of chemical substitutes. Chemical substitutes are likely to be more costly to produce and therefore less profitable than CFCs and halons. In contrast, CFC and halon prices are likely to increase because of the supply restrictions set forth in EPA's regulation which could result in substantial windfall profits for CFC producers. As a result, EPA is concerned that the seven CFC and halon producers may use their market power to increase profits either by restricting the introduction of new chemicals by others or by delaying the introduction of the chemical substitutes they now have under development.

EPA is seeking public comment on whether markets conditions are likely to create an environment where such actions are possible. Factors affecting future market conditions include: who conducts research and development for new chemicals; who conducts research and development for user industry applications; what is the likely cost of chemical substitutes; and whether the CFC/halon producers can deter competition from outside parties.

Based on a review of patents on potential substitutes, it appears that the current producers of CFCs and halons are also the most likely producers of alternatives (Radian, 1987). For example, patents for HFC–134a and HCFC–123, two of the most likely substitutes, are held by several CFC producers in the United States as well as by CFC producers in other countries. Moreover, a large share of the products applications testing for many industries using CFCs is done by the chemical producers. These companies provide a wide range of services to their customers including detailed tests on the applicability and use of new chemicals.

Estimates of the costs of producing chemical substitutes generally range from 2–4 times the costs of the currently available CFCs (Nelson, 1988). This large difference in the costs of production between the current CFCs and their substitutes suggests that CFC producers may have considerable flexibility in pricing CFCs to respond to efforts by non-producers to capture markets with more expensive chemical substitutes.

Whether chemical producers will use this incentive to delay the introduction of chemical substitutes to increase windfall profits will depend on the extent to which they are willing and able to pursue a strategy of profit maximization. One public interest group in their comments on the December proposal contended that firms typically base decisions concerning the timing of new product introductions on such factors as the goal of maximizing profits on existing products. The following discussion indicates that CFC producers may have the *ability* to pursue such a goal; moreover, with the large potential windfall, it is clear that they will have an economic *incentive* to do so.

In most market situations, the company first to introduce a new product has the advantage. In this particular situation, however, 14 major chemical firms from throughout the world are working together as part of a private consortium in conducting joint toxicity tests. This joint effort offers many important advantages. It spreads the multi-million dollar costs of conducting these tests among many participants. It maximizes the use of the limited quantities of the new chemicals available for all purposes (toxicity tests and user application tests) in the near term. However, a public interest group in its comments raised the issue that this joint effort effectively creates a potential mechanism for these firms to delay or slow down the introduction of new chemicals by influencing the pace and extent of toxicity testing. Thus, in the current market situation, the producers of CFCs are the owners of the most likely substitute technologies (e.g., through patents and proprietary process information) and could through the joint toxicity testing program and the high capital costs of production, be able to control the rate of diffusion and adoption of substitutes.

Future increases in CFC prices will also provide an incentive for non-CFC producers to develop and market substitutes. However, these firms will be at a disadvantage for several reasons. As previously suggested, they generally lack the research, technical and marketing foundation to compete against current CFC producers. Moreover, current CFC producers could attempt to counter the introduction of substitutes by others by reducing the market price of CFCs (and thereby reduce but not eliminate their windfalls).

EPA believes that a regulatory fee, by capturing the windfall profits, would remove the economic incentive for delay and thus at least partially address these concerns.

3. Impact of a Two-Year Delay

The revised RIA supporting the final rule examines the potential impact of delaying by two years the introduction of chemical substitutes. This analysis, as shown in Table 1, compares the impact of different schedules for the introduction of chemical substitutes on the costs and feasibility of meeting the

reductions called for in EPA's regulation. It illustrates several critical points. First, it shows that the effect of delaying the marketability of chemical substitutes is closely related to the rate at which firms act to adopt low-cost control options. Not surprisingly, the amount of pre-tax windfall, as well as the cost increases resulting from the delay of chemical substitutes, is substantially greater in Case 1 than in the other two cases. Case 1 represents a scenario in which major user industries (e.g., mobile air conditioning, solvent uses, hospital sterilization, refrigeration and certain foam uses) delay their adoption of technically available, low-cost reduction options. Table 1 shows that windfalls through the end of the century would *increase* by $10 billion through the end of the century under this scenario if the introduction of substitutes were delayed by two years. The potential increase in windfalls for producers from a two-year delay were estimated to be $1.3 billion in the Case 1A+B (where two industry segments aggressively employ reduction technologies) and $100 million in Case 2 which represent a scenario where user industries adopt technologically feasible, low-cost controls in a more timely manner. Table 1 also shows that windfalls in the early years could be quite substantial (case 1) or could be eliminated completely if low cost options are actively adopted (case 2).

TABLE 1.—IMPACTS OF A TWO-YEAR DELAY IN THE AVAILABILITY OF CHEMICAL SUBSTITUTES [a]

	Case 1 [b]		Case 1A+B [c]		Case 2 [d]	
	Without delay	With delay	Without delay	With delay	Without delay	With delay
Social Costs: [e] 1989–2000	2,730	4,252	2,122	2,215	1,012	1,033
Transfer Costs: [f] 1989–2000	7,282	17,390	4,983	6,329	1,886	1,985
CFC Price Increases: [g]						
1989	5.69	5.69	1.95	1.95	0.00	0.00
1990	5.32	5.32	1.84	1.84	0.00	0.00
1991	1.84	5.88	1.59	1.85	0.00	0.00
1992	1.60	5.88	1.55	1.95	0.00	0.00
1993	3.93	[h] 50.00	3.55	10.84	1.55	1.84
1995	5.48	5.00	3.55	3.77	1.59	1.59
1998	5.48	17.69	5.48	5.48	4.49	4.49
2000	5.48	5.48	5.48	5.48	3.77	4.35

[a] The assumed stringency and coverage assumptions used are those of the CFC 50%/Halon Freeze case described in Chapter 5 of the RIA. CFCs are regulated with an initial freeze in 1989 at 1986 levels, 20 percent reduction in 1993, and 50 percent reduction in 1998, and halons are frozen at 1986 levels in 1992. The assumed rate of growth in baseline use is the Middle Growth Scenario described in Chapter 4 of the RIA.

[b] Case 1 assumes that firms do not act expeditiously to employ cost-effective control options. For specific control options that are delayed, see Chapter 9 of the RIA.

[c] Case 1A+B assumes that reductions from recycling of car air conditioners and shifts to alternative solvents are initiated in the initial years of the regulation, but that other sectors delay their adoption of cost-effective reductions. See Chapter 9 of the RIA.

[d] Case 2 assumes control reductions are adopted across several key industries as explained in Chapter 9 of the RIA.

[e] Social costs discounted at a 2 percent discount rate and cited in millions of 1985 dollars. All windfalls are stated before taxes.

[f] Transfer payments discounted at a 6 percent discount rate and cited in millions of 1985 dollars.

[g] Price increases are for all CFC compounds and are stated in dollars per kilogram are weighted by ozone depletion potential and are cited in constant 1985 dollars. CFC prices are currently about $1 per kilogram.

[h] CFC price increases are capped at $50.00 which indicates that insufficient controls or substitutes are contained within the model to achieve the required reduction.

Table 1 also illustrates a second point. It shows that in Case 1, a two year delay renders it significantly more costly and difficult to meet the 20 percent reduction stage in 1993. The $50.00 CFC price increase which occurs in that year is a "backstop" price indicating that, based on current information, no alternative technologies are available to achieve the required reductions. In the absence of technologies or substitutes to reduce CFC use to the required levels, the economic hardship and dislocations in meeting the required reductions would be severe. The dealy in the availability of chemical substitutes would also make it more difficult to obtain greater or further CFC and halon reductions in the future, should new scientific information lead to a change in the Protocol's control requirements.

This analysis likely underestimates the additional costs associated with delays in introducing chemical substitutes by ignoring potential savings that are likely as firms start "learning by doing" earlier rather than later (Decanio, 1988). This potential savings reflects the likely reductions in cost over time that will occur as producers and users gain experience with the chemical substitutes.

A regulatory fee could also indirectly aid in efforts to encourage developing nations to join the Protocol. One goal of the Protocol is to avoid expanded production of CFCs by these nations. To accomplish this end, the Protocol allows limited increases in production of controlled substances in developed nations if they are exported to developing nations. Because of the technological ease of CFC production, developing nations may choose to produce CFCs themselves and not to join the Protocol if CFC substitutes are not readily available. Further, over the longer term, developing nations are more likely to participate in the protocol if they can themselves produce the chemical substitutes required for their domestic industries (e.g., refrigeration, electronics, etc.) which now use CFCs. Thus, the timing of the availability of chemical substitutes will be one key factor in decisions by developing nations to join the Protocol.

4. Summary of Public Comments

Seven commenters (auto companies, federal agency, public interest groups) stated that they opposed the use of allocated quotas alone because it would result in a small number of producers reaping substantial windfalls and allow them to exercise substantial power over user industries through control of CFC supplies. Some of these commenters also raised concerns about the possibility of producers cutting production further than the regulations require (to further increase prices) or delaying the introduction of chemical substitutes.

Ten commenters (public interest groups) stated that they supported the use of a regulatory fee because if would provide an added incentive for firms to reduce their consumption of CFCs and halons and would capture the windfall profits that might otherwise encourage

producers to delay the development of chemical substitutes.

In contrast, six commenters (chemical producers and industry trade association) argued that EPA had overestimated the magnitude of likely windfalls. As stated earlier, EPA's Regulatory Impact Analysis (RIA) supporting the proposed regulation stated that, depending on the rate at which firms shifted away from CFCs and halons, the magnitude of windfalls would range from just under $2 billion to just under $6 billion (pre-tax dollars) over the remainder of this century. The commenters suggested that this estimate failed to consider the higher costs associated with reduced CFC production, the increase in government tax receipts from any windfalls, and the need for capital to fund development of chemical substitutes. Several commenters also stated that because chemical producers are likely to allocate their allowable production to past customers and therefore are not likely to charge full market price for CFCs and halons, windfalls would be lower than EPA's estimate.

The Agency's reexamination of its analysis in light of the public comments has reaffirmed its general conclusions on the magnitude of the potential windfalls. The Agency recognizes that fixed costs may increase slightly as production is cut; however no evidence has been presented demonstrating likely increases in variable costs which represent by far the largest percent of total production costs. As a result, production costs are not likely to increase substantially in future years. While the RIA presents estimates of transfers in pre-tax figures, EPA recognizes that to determine a firm's actual windfall profits, the figures presented would have to be adjusted to reflect each firm's marginal tax rate. EPA's estimate of CFC price increases and transfers were similar to those contained in an industry-sponsored analysis (performed by Putnam, Hayes and Bartlett for the Alliance for Responsible CFC Policy, 1987) of the impact of the proposed rule.

EPA also questions the assertion by some chemical producers that they intend to moderate price increases and allocate their supplies to past customers which would have the effect of reducing windfalls. Although firms can point to past situations of shortages where supplies have been rationed (instead of sold at a market-clearing price), these situations typically involve only minor and temporary shortfalls in supply. In the case of CFCs, shortages are likely to increase over time and, unless regulations change, are permanent. The use of allocations by producers to their customers would substantially reduce the potential profits from these chemicals to the producers. In addition, if a secondary market developed, users for which current CFCs are less important or which can utilize existing substitutes or can recycle ("elastic" users), would have an incentive to sell some of their allocation to users with little flexibility ("inelastic" users) at higher prices than they paid for the CFCs. Thus, these "elastic" CFC users would capture much of the windfall for themselves. Mindful of this, there is a strong incentive for the producers to recoup the windfalls themselves rather than see their customers the beneficiaries of these profits. Moreover, any allocation of these chemicals would likely result in substantial economic inefficiencies unless a secondary market quickly developed. If allocated CFCs or halons, user frims with relatively inexpensive reductions would have less of an incentive to make such reductions, while firms without such options would have a more difficult time in purchasing CFCs or halons. The net effect of an allocation by producers would be a substantially greater cost to society to achieve any given reduction (Decanio, 1988).

EPA also strongly disagrees with some commenters arguments that windfalls are necessary to fund the development of chemical substitutes. This argument suggests that price increases for the current CFCs should be used to subsidize specific firms (i.e., the current CFC and halon producers) to develop alternatives. EPA believes that, at least in the medium and long-term, many firms besides the current CFC and halon producers are capable of developing substitutes, and that all such firms should have equal opportunity to bring substitute chemicals to the marketplace. Investment decisions concerning the development of new chemicals by existing CFC and halon producers should be based on market potential and not indirectly subsidized by EPA regulations.

EPA's analysis contained in the RIA also suggests that the amount of the windfall profits (e.g., several billion dollars) is far in excess of the resources now being spent by the chemical producers for research on chemical substitutes. Morover, there would be no guarantee that producers would channel their windfalls back into the development of alternative chemicals. Finally, given the substantial market for alternatives to CFCs, EPA does not agree that any such subsidy is necessary or warranted.

Many industry commenters (primarily foam-blowers and halon users) opposed the use of a fee system they believed it would increase the cost of the regulated chemicals and thus their costs of doing business, and would also make it difficult to compete against product substitutes particularly in some foam areas.

EPA does not believe that a fee, used in conjunction with allocated quotas, would necessarily alter the price of CFCs and halons to user industries. As discussed above, the price of these chemicals is determined by supply and demand. As a result, the price should increase over time because of the scarcity created by the limits on production contained in the allocated quota regulation; consequently, all user firms will pay somewhat higher prices over time if they want to continue using these chemicals. By setting the fee at or below the market price increase resulting from the reduced availability of these chemicals (i.e., the price increase which results from the scarcity created by allocated quotas), no further increase in the price of CFCs or halons should occur. The fee would, however, reduce or eliminate the amount of windfall profits to the producers and capture that revenue for the United States Treasury, therefore eliminating any potential economic incentive to delay the introduction of less profitable chemical substitutes.

Some users appear to believe that producers will simply pass on the additional costs of the fee to the user industries, in effect charging them both the price increase due to the scarcity created by the allocated quotas and the added costs of the fee. If producers attempted to do so, the forces of the marketplace would operate to reduce demand for CFCs and halons below the level of their allocation. Thus, producers would see the additional profits they would earn on CFCs sold at a higher price offset by the foregone profits from lost sales. However, under a fee system which captured the entire windfall (e.g., a fee based on the difference between observed market price and production costs) producers would never benefit from attempting to pass the fee on to users.

B. Design of Fee With Allocated Quota System

Table 1 shows the amount of CFC price increases for different scenarios. These increases would effectively be the same as the rate at which a fee would be assessed if all the windfalls were

captured and production costs remain unchanged. The table shows that the magnitude of the fee (or CFC price increase) depends on the rate at which firms reduce their consumption of CFCs. In fact, in Case 2, where firms in many sectors act quickly to reduce CFC consumption, no fee would be expected in the initial years of the regulation.

The December 14 NPRM briefly described issues related to the design of a regulatory fee. Design parameters mentioned included phasing-in the fee, basing the fee on the relative ozone depletion weights of the different chemicals, and adjusting the fee over time (e.g., to reflect changes in market conditions, regulatory requirements, etc.).

EPA received few comments on specific design issues. A chemical manufacturer and an auto company stated that, because of the limited detail contained in the December NPRM, any fee schedule would require additional public notice and comment including review at a public hearing. The chemical producer also stated that the CFR and Halon price increases contained in EPA's RIA analysis were sufficiently flawed that they should not be used as the basis for setting a fee. EPA agrees with these comments; additional analyses, public review and comment are necessary before a regulatory fee can be adopted.

Although EPA has concerns, discussed below, about whether it has the authority and administrative capacity to design and administer a large fee program, the following sections discuss specific design issues related to implementing a regulatory fee program. The fee system should be narrowly circumscribed to further the regulatory purpose in section 157(b), (or TSCA Section 6, if TSCA is used as the authority for the fee). EPA believes that the following methods of setting a fee further the purpose of that section, but is seeking comments on all issues related to its use of a regulatory fee.

1. Setting a Fee

In evaluating options for setting a fee, EPA has considered a number of issues, relating to the design and administration of the fee.

(i) When does a windfall profit arise? Specifically, producers legitimately expect a "regular" (non-windfall) profit—*i.e.*, a reasonable rate of return. How should the Agency determine when profit margins exceed the reasonable rate of return as a result of the Protocol/EPA restrictions?

(ii) How should the windfall profit be computed? In general, the windfall profit is the difference between (a) market price and (b) costs plus reasonable rate of return. How should the Agency compute each element? For example, should EPA use actual current market price and actual costs, and actual rate of return during the pre-Protocol period (when no restrictions applied and thus no windfall profit situation existed)? Or, should EPA use proxies for some or all of these elements?

(iii) Should EPA's fee try to capture some or all of the windfall? What are the advantages and disadvantages of trying to capture the entire windfall?

(iv) How would EPA administer the fee? For example, what collection procedures would be necessary? What types of appeals could be expected between EPA and the industry, and by what administrative mechanism could those appeals be resolved? Note that these administrative concerns may vary, depending on how the fee is designed.

2. Options for Fee Design

a. Predetermined Escalating Fee Schedule. EPA could establish in its rule a set fee schedule which would escalate over time to reflect the expected increasing market price of CFCs and halons (as demand for these chemicals increases over time, but supply is reduced by EPA's regulation). In setting a fee schedule, EPA would also consider the expected costs and timing of the intoduction of new chemical substitutes which would act as a ceiling on potential CFR and halon price increases.

A predetermined fee schedule has the advantage of providing clear market signals for both producers and users. Depending on the level at which the fee was set, it also could remove much but probably not all of the potential for windfalls. It has the important disadvantage of being inflexible to new technological developments that could significantly influence future market conditions.

Based on EPA's existing analysis of control costs and chemical substitutes as explained in the RIA, the regulatory fee could be set at approximately $.25 per kg in the initial stage of the program and increase in a linear manner to approximate the currently anticipated costs of chemical substitutes (about $5.40/kg) in 1993 when they are expected to become available.

b. Fees Based on Model Predictions. EPA would initially set the fee based on (i) predicted market price, determined directly from the analysis contained in its RIA (which would be periodically updated); and (ii) estimated production costs (plus a reasonable rate of return), determined by a calculated baseline production cost periodically modified to reflect inflation and changes in the price of raw materials. For predicted market price, the Agency could use the average of its Case 1 and 2 scenarios (see Table 1) (which spans the likely response by industry) or it could develop a "most likely scenario." For estimated production costs, EPA could determine the production costs in a base year (e.g., a year before the Protocol came into effect) plus the profits earned that year. EPA could then index these numbers (costs plus profits) for inflation and changes in the price of raw materials. The windfall would be the difference between the predicted market price and the estimated production costs.

By estimating the market price *increases* in CFCs and halons, the RIA model theoretically predicts the amount of the windfalls assuming no changes in production costs. However, given the complexity of the analysis, the control cost model used in the RIA could predict increases that are either too high or too low. EPA may want to base the fee on some percentage of its estimated price increase (e.g., 90 or 95 percent) to avoid imposing a fee higher than the windfall that would directly result from the forces of supply and demand. In addition, as new information becomes available, the analysis would have to be periodically updated to reflect actual market responses.

If the analysis contained in the current RIA were used to set the amount of the fee and the fee were based on 100 percent of the average of Case 1 and 2 scenarios and assuming no changes in production costs, (i.e. no indexing of production costs plus a reasonable rate of return), the fee amounts would be the following:

Year	Projected CFC price increase [1]
1989	$3.39
1991	0.92
1993	2.66
1995	2.68
1999	4.99
2000	4.62

[1] Assumes no change in production costs and no increase in reasonable rate of return.

c. Adjustable fees based actual market price. Under this approach EPA would base the fee on (i) actual market prices of CFCs and halons and (ii) either actual or estimated production costs (plus a reasonable rate of return). As in the last option, if production costs were esitmated, a base year prior to the Protocol restrictions would be selected. For example, if production costs were estimated using 1986 as the base year, the difference between the 1986 market

price charged by CFC and halon producers for the controlled substances and the price charged in the marketplace for these chemicals after the allocated quota system were implemented would be used to determine the fee. Future market prices would be used in determining the amount of the fee. Future market prices would be used in determining the amount of the fee to ensure that the net prices (i.e., reflecting any increases in production costs) received by CFC producers were constant. Under this approach, future production cost increases could be calculated based on an inflation index and published prices for feedstocks chemicals. Instead of estimating changes in production costs, EPA could determine actual production costs, plus the reasonable rate of return in the base year, in order to calculate windfalls.

Basing the amount of the fee on observed prices would relieve EPA of the burden of attempting to forecast price changes. This approach would also likely result in a fee that fluctuates, as market prices change to reflect the introduction of new chemical substitutes. One likely outcome is a fee that is first higher and then lower. In the initial years of the phased reduction of CFCs, the price of CFCs is likely to increase up to the price level set by supply and demand as a result of the scarcity created by the allocated quotas. In the years following the introduction of chemical substitutes, the market price is likely to decrease as producers improve the efficiency of making these chemical substitutes and as users make more efficient use of them. Thus, the amount of the fee would be contingent on the amount of the CFC increase in price; only as long as the marginal costs of the chemical substitutes exceed the marginal costs of the CFCs, a fee be charged. This indicates an automatic "sunset" provision in the fee structure; the fee is self-extinguishing as substitutes become cheaper to produce over time.

This approach to setting a fee would effectively eliminate windfalls and thus remove any economic incentive producers may have to increase revenues from sales of existing CFCs or halons by withholding the supply of chemical substitutes. As a result, this approach effectively removes any economic incentive to delaying the introduction of chemical substitutes and thus is the approach most preferred by EPA.

3. Issues Related to Implementation of a Fee

EPA is also seeking public comment on whether the fee should be assessed against production, or against consumption (defined in the Protocol as production plus imports minus exports) of controlled substances. A fee on production alone would entail charging domestic producers for CFCs produced (including those exported), and would not impose charges on CFCs imported. This would increase costs only to domestic producers and would result in imports having a competitive advantage over domestic production and United States exports facing a competitive disadvantage vis-a-vis foreign production. A fee assessed against consumption would amount to a charge on all CFCs produced and imported, with an exemption or credit for CFCs exported. Allowing exports to be exempt from the fee would avoid burdening industry in the United States in its competition abroad without undermining the effectiveness of the fee program. A fee on consumption would be assessed against the limited number of producers and importers and not involve the collection of fees from the thousand of firms who use (but do not produce or import) controlled substances.

4. Uses of Revenue From a Fee

The goal of any regulatory fee under section 157(b) of the Clean Air Act or under Section 6 of the Toxic Substances Control Act would be to remove the incentive for delaying the introduction of chemical substitutes by reducing the size of windfall gains to producers. Under 31 U.S.C. 3302(b), any revenues generated from the assessment of a fee would go directly to the United States Treasury.

Because of this legal limitation, EPA is not considering a program to channel some portion of the estimated potentially multi-billion dollars in windfalls back to those industries developing or employing reduction technologies for CFCs and halons. Any such program could only be authorized directly by Congress. While allowing the CFC and halon producers to maintain the windfall profits themselves would be clearly inequitable, making some portion of the windfalls available to any firm developing or using reduction technologies might be potentially attractive in aiding the transition away from CFCs and halons. Resources might also be made available to groups of firms or associations working toward removing the institutional barriers (e.g., codes and practices, purchasing specifications) to shifting away from CFCs and halons. EPA is seeking public comment on the desirability of providing funding for the development of alternatives to CFCs and halons, how such program might be structured, and what legislative action would be necessary.

IV. Auctions

In it December 14 NPRM EPA also asked for comment on the use of auctions as the mechanism for allocating production and consumption allowances. In that notice, EPA stated several advantages of auctions. Specifically, an auction system should result in reductions being achieved in an economically efficient manner and any revenues from the auction would to directly to the United States Treasury.

Auctions are attractive, in part, because they provide a direct mechanism to ensure that the available CFCs and halons are awarded to he highest value uses. Through the bidding process, individual firms must determine how much they value the use of these chemicals. By awarding CFCs and halons to the highest bidders, this system ensures that the limited supply of these chemicals are put to their most economical uses. A major advantage of an auction is that it automatically yields a price for production and consumption allowances that reflects the expected windfall. Under an auction system, each bidder has the incentive to bid as close as possible to the expected value of the allowances. Firms that underbid at an auction could obtain fewer allowances than desired; firms that overbid would either pay a price greater than the value it placed on the allowances or would obtain more allowances than desired.

As discussed in the prior section in the context of adding a fee to allocated quotas, auctions would avoid the problems associated with potential billion dollar windfalls which would accrue to a handful of CFC and halon producers under allocated quotas alone. The revenue from higher CFC and halon prices which result from restricting supply of controlled substances as called for by the Montreal Protocol would instead be transferred to the Treasury through the auction system.

Because of these potential advantages, EPA is seeking additional public comment on the possibility of shifting sometime in the future from the allocation scheme contained in its final rule to one in which production and consumption allowances would be auctioned to any interested party. EPA intends to make such a determination within 90 days of the end of the public

comment period. If the Agency pursued this option, it would issue a notice of proposed rulemaking seeking public comment on a specified deadline for shifting from allocated quotas to auctions and specific changes in its rule to allow for such a shift, and would then issue a final decision on whether to provide for auctions.

A. Public Comments on December NPRM

A large number of industry commenters, including both CFC producers and user firms, argued against the use of an auction on the basis that it would result in greater market uncertainty, and encourage speculation and hoarding. CFC producers asserted that auctions would lead to: higher prices due to speculation and hoarding; increased uncertainties concerning production planning by allowing any person to hold production allowances; and a disincentive for the production of chemical substitutes by unnecessarily disrupting user markets. Producers also commented that problems associated with auctions were likely to be worse in the early years following implementation.

With the exception to some firms within the automobile industry, CFC and halon user industries also strongly opposed auctions. These firms were primarily concerned that firms would purchase more of these chemicals than they otherwise needed, thereby driving up prices. They were also concerned that speculators would enter the market, further adding to market uncertainties. Commenters asserted that problems of an auction could harm small firms disproportionately. They argued that such firms could be "shut-out" or outbid by large firms.

In contrast, several commenters supported the use of auctions as economically efficient and as a means of avoiding large transfers to producers which would result from simply allocating quotas based on past activity. One commenter argued that speculators would help stabilize the market by buying up allowances when prices were low and selling when prices are high. The commenter also stated that successful participation in an auction would be based on the value of CFCs to a firm and not on the size of a firm. To the extent that these may be problems, such difficulties are likely to be eliminated overtime through market transactions.

Several commenters stated that EPA had not provided sufficient detail in its description of an auction to permit adequate review and comment and therefore could not issue a final action without seeking additional public input. Several also questioned EPA's legal authority for implementing and auction. These legal issues are discussed below, in section V.

EPA has reviewed the public's response on this issue, and is seeking additional comment on possible ways to structure an auction system which would address the problems raised by commenters.

B. Structure of an Auction System

1. *Participation rules.* EPA believes that auctions should be open to all interested parties. Any limits on participation (e.g., only users, producers) would unnecessarily disrupt market forces.

While the auction would be open to all interested parties, EPA does not believe that most of the tens of thousands of firms who use CFCs and halons are likely to directly participate. These firms are more likely to continue using their current channels of supply (e.g., wholesalers and chemical producers) and rely on these firms to ensure that requirements for production and consumption allowances have been satisfied. Because of the limited participation by small users, EPA does not believe that the administrative costs associated with an auction would be excessive.

2. *Defining the commodity.* To implement the Montreal Protocol's limits on both production and consumption, separate auctions could be held for consumption and production allowances. Firms interested only in importing controlled substances would likely bid only on consumption allowances. Producers of controlled substances would likely bid on both production and consumption allowances. Producers could also rely on their customers to supply the consumption allowances also required for production under the Montreal Protocol.

All allowances would be transferable to provide firms maximum flexibility to respond to changes in market conditions. The allowances could also be for a single control period or they could allow the same amount of production or consumption for each of one or more periods (e.g., 100 units for each of the control periods covering 1988 and 1989). To ensure that the United States complies with the terms of the Montreal Protocol (which requires Parties to stay within limits defined in terms of 12-month control periods), allowances could be defined for multiple control periods, as long as they did not allow trade-offs between periods.

Allowances of a shorter duration would also reduce concerns that allowance holders, who are likely to include producers of CFCs and halons, might have an economic incentive to delay the introduction of chemical substitutes in order the maximize their market position.

To be consistent with the Montreal Protocol, all allowances would be defined in terms of Group I (CFCs) and Group II (halon) controlled substances and separate auctions would be held for each.

3. *Frequency of auctions.* The frequency of auctions could be an important factor in minimizing concerns raised about the possibilities of uncertainty and hoarding. Frequent auctions would help establish a market price, which would reduce uncertainties concerning the price or controlled substances. They would also ensure that a supply of CFCs is continuously made available to the public and thereby avoid concerns about hoarding.

4. *Bidding system.* To minimize administrative costs, the auction itself would likely be held through the mail. Firms would base their bids on the value to them of using controlled substances, which would be determined, in part, by the costs of alternative controls and technologies. Sealed bids would also minimize any gaming (e.g., bids based on competitor's actions) which could occur through public bids. Firms could submit as many bids as they want.

5. *Basis for Awards.* Awards would go to the highest bidders until all of the allowances up for auction are distributed. Under different auction systems, the price charged to the winning bidders may vary. Under one system all winning bids pay the amount contained in their bid. Under an alternative approach, each successful bid would pay an amount equal to the highest unsuccessful bid.

C. Public Comment

EPA is seeking public comment on the desirability of shifting from the promulgated allocated quota system to a regulatory system based on auctions, and on ways to minimize any disruption associated with such a shift. It is also seeking comment on the specific auction design features presented above.

V. Legal Issues Related to Fees and Auctions

In the December 13 NPRM, EPA specifically sought comment on the legality of adopting a regulatory fee or an auction (52 FR 47508). Numerous commenters (chemical producers and industry trade association) stated the

EPA does not possess the authority to use a fee or an auction. They argued that such a charge—a fee or an auction—would in effect constitute a tax and EPA does not possess the power to tax under the Clean Air Act or the Toxic Substances Control Act. In contrast, two commenters (federal agency and public interest group) stated that EPA did have the authority to use fees or auctions.

While EPA believes that CFC charges make good policy sense to eliminate any windfall that may arise, EPA recognizes that imposing CFC charges would be a novel interpretation of the environmental statutes. This action would represent regulatory action by an administrative agency, pursuant to an asserted, but not explicit, grant of authority from Congress, to collect charges. The sections below discuss the extent to which CFC charges would be legally permissible.

Two statutes that EPA administers provide possible legal authority: The Clean Air Act provides for the regulation of substances that may affect the stratosphere. Section 157(b) of the Clean Air Act describes the regulatory authority:

> [T]he Administrator shall propose regulations for the control of any substance, practice, process, or activity or any combination thereof) which is his judgement may reasonably be anticipated to affect the stratosphere, especially ozone in the stratosphere, if such effect in the stratosphere may reasonably be anticipated to endanger public health or welfare. Such regulations shall take into account the feasibility and the costs of achieving such control.

In addition, the Toxic Substances Control Act ("TSCA") provides for the regulation of toxic substances. Section 6(a) of TSCA provides that, after finding that a substance presents an unreasonable risk of injury to health or the environment—

> [T]he Administrator shall by rule apply one or more of the following requirements to such substance or mixture to the extent necessary to protect adequately against such risk using the least burdensome requirements . . . (5) A requirement prohibiting or otherwise regulating any manner of method of commercial use of such substance or mixture.

A third possible source of authority is the Independent Offices Appropriation Act ("IOAA") 31 U.S.C. 9701(a), which authorizes agencies to impose fees when granting benefits to outside parties.

Conscious that it may be breaking new ground, EPA is soliciting comments on the legal rationale for administrative charges in this context. EPA sees two sets of legal issues: The first are Constitutional issues, including (i) whether the administrative charges are "taxes" (i.e., whether the asserted grant of congressional authority represents a delegation of the Congress' authority under the Constitution to impose taxes [1]) or "fees" (i.e., whether the grant of authority represents a delegation of the authority to regulate commerce [2]); and (ii) whether any delegation of authority from Congress to EPA to impose charges under the CAA or TSCA was sufficiently circumscribed to avoid delegation-of-legislative-power questions. The second set of issues involve statutory interpretation, i.e., whether Congress in fact delegated authority to EPA under the CAA or the TSCA to impose these charges.

A. Constitutional Issues

1. Summary of Case Law

Three Supreme Court cases, and the series of appellate court cases that follow them, raise the Constitutional issues EPA is considering. In *National Cable Television, Inc.* v. *United States*, 415 U.S. 336 (1974) ("NCTA"), the Supreme Court construed the IOAA, and held that under this statute an agency may not impose a charge in excess of the value of agency services or other action to the recipient because such a fee would be a "tax." The Court defined a tax as a charge that has no necessary relationship to benefits received, may be based solely on ability to pay, and may be designed to serve public policy by, e.g., discouraging certain activities or preventing "entrepreneurs from exploiting a semipublic cause for their own personal aggrandizement." By comparison, according to the Court, a "fee" connotes some benefit, and is incident to a voluntary act such as a request for a permit. *NCTA*, at 341.

In *Head Money Cases (Edye* v. *Robertson)*, 112 U.S. 423 (1884), and a series of appellate court decisions decided under it, the courts have upheld charges as being fees—and not taxes—when the statute under which the charges were imposed was regulatory and the charges were closely tied to the regulatory purpose of the statute. *See, e.g., Brock* v. *Washington Metropolitan Area Transit Authority*, 796 F.2d 481 (D.C. Cir. 1986), *cert. denied*, 95 L.2d. 494, 107 S. Ct. 1887 (1987) and causes cited therein. The tests cited in these cases are discussed more fully below.

In *Federal Energy Administration* v. *Algonquin SNG, Inc.*, 426 U.S. 548 (1976) ("*FEA*"), the Supreme Court upheld a license fee imposed on imported goods under the Trade Expansion Act of 1962. The Court found that although this Act did not by its terms explicitly authorize the imposition of such license fees, it did include a grant of regulatory authority that was broad enough to encompass the charges. The Court further found that the legislative history of the Act contemplated license fees. Although not discussing any distinction between taxes and fees, the Court found that the statute provided sufficient guidance for agency action to avoid any question of "unconsitutional delegation of legislative power." *Id.* at 558–62.

2. Application to CFC Charges

EPA solicits comments on how to reconcile these various strands of the case law, and the extent to which the CFC charges would be permissible under the case law. The following is a brief sketch of some of the important issues.

The case law, particularly *NCTA* and appellate cases decided under it, may be read to indicate that the courts generally have been wary of upholding administrative charges, in particular charges that can be construed as representing "taxes," *i.e.*, of finding that Congress delegated to an agency the legislative authority under the Construction to impose taxes. See *e.g., National Association of Broadcasters* v. *Federal Communications Commission*, 554 F.2d 1118, 1129 n.28 (D.C. Cir. 1975). *But see* Gillete & Hopkins, *Federal User Fees: A Legal and Economic Analysis*, 67 B.U.L. Rev. 793, 822–24 (1987).

The argument that a CFC charge—either a fee or an auction—may be considered a "tax" under *NCTA* rests on the assertion that it is designed to serve public policy by eliminating the incentive to delay introducing chemical substitutes. If so, a CFC charge may not be authorized. On the other hand, it may be argued that the CFC charge amounts to a fee that is authorized because it is paid in exchange for the privilege granted by the Federal government to continue production of CFCs.

EPA is also soliciting comments on the extent to which the CFC charges meet the criteria in *Head Money Cases* and its progeny. In general, the administrative charges upheld under these cases involved (i) explicit statutory authorization for the charges and (ii) a close connection between the charges and the regulatory purpose of the statute, *e.g.*, in most of these cases, the funds were used by the agency as part of the regulatory scheme. *But see Rodgers* v. *United States*, 136 F.2d 992 (6th Cir. 1943). By contrast, the CFC charges—either a fee or an auction—are not explicitly authorized by statute and

[1] U.S. Constitution, Art. I, Sec. 8, cl. 1.
[2] U.S. Constitution, Art., I Sec. 8, cl. 3.

would not be used to fund the regulatory purpose of the statute.[3]

However, arguments may be made that the CFC charges are regulatory fees within the spirt of *Head Money Cases* and its progeny. The charges are designed to remove the economic incentive to delay the introduction of chemical substitutes that results from the sizable windfall profits that could accrue to the handful of CFC and halon producers by EPA's allocated quota regulation. As described above, if chemical substitutes are delayed, it may prove costly and difficult for industry to achieve the reductions required by the Montreal Protocol and by EPA's regulation. Moreover, any significant delay in the availability of new chemicals would make it more difficult to achieve greater or faster reductions in CFCs and halons if future changes in reduction occur. Seen in this light, according to this argument, the charges implement the regulatory purpose of CAA section 157(b), which is to protect the stratosphere. If chemical substitutes are not made available in a timely manner, the overall costs to society of meeting the regulatory goals would be increased as more expensive controls are used in lieu of chemical substitutes. As a result, it could be argued that the use of a charge as an adjunct to the allocated quotas system may be consistent with the provisions of section 157(b) that require the Agency to take into account the "feasibility and cost of achieving such control."

For much the same reasons, it may be argued that the charges implement the regulatory purposes of the TSCA. The legislative history of Section 6 of TSCA reveals specific congressional concern that certain steps be taken to minimize the chance that regulatory action might generate monopoly profits. *See* Conference Report on Toxic Substances Control Act, H. Rep. No. 94–1679, 94th Cong., 2d Sess. 75 (1976). However, as discussed below, it is uncertain whether this legislative history can be read to contemplate fees or auctions.

The case for CFC charges may also be strengthened by *FEA*, in which the Supreme Court upheld charges that were not explicitly authorized by statute in light of the broad scope of regulatory authority the statute granted. In that case, however, the Court further found that the legislative history of the statutory provision provides "much to suggest" that license fees were authorized. As discussed below, the legislative history of the Clean Air Act and TSCA is not as clearly favorable for CFC charges. Moreover, EPA is examining how to reconcile *FEA*—which did not raise the issue of whether the charges represented a delegation of the taxing power or the power to regulate commerce, and thus did not explicitly discuss whether the charges implement the regulatory purpose of the statute—with *Head Money Cases* and its progeny, which do not undertake that analysis.

EPA solicits comments on the extent to which the CAA or the TSCA, by its terms, provides sufficient guidance for imposing charges—either fees or auctions—to avoid delegation-of-legislative-power questions, under *FEA*.

B. Statutory Interpretation Issues

EPA is further examining the extent to which CFC charges fit within the intended scope of the regulatory authority Congress granted EPA under either CAA Sec. 157(b) or TSCA Sec. 6(a)(5). CAA Sec. 157(b), as quoted above, provides a grant of regulatory authority that is written broadly—"regulations for the control of any substance, practice, process, or activity * * * which * * * may reasonably be anticipated to affect the stratosphere * * *." Two commenters (public interest group, federal agency) argued that these terms are broad enough to permit the imposition of CFC charges. Further, the House Commerce Committee verified that Congress intended a broad grant of regulatory authority:

> Stratospheric protection measures are not confined to use of the best control technology or to requiring compliance with technologically feasible emission limitations * * * "[C]ontrols" may include design standards, work practice standards, prohibitions, and/or such other measures as may be necessary to assure protection for health and environment and to protect the stratosphere.

H. Rep. 94–1175, *reprinted in* "A Legislative History of the Clean Air Act Amendments of 1977" Congressional Research Service (1978) at 6630 n.2 ("Legislative History").

On the other hand, other aspects of the Clean Air Act Amendments of 1977 and the legislative history raise questions about the extent to which Congress believed that the concept of economic regulations was sufficiently well developed to be relied on. For example, Congress included in the CAA Amendments (i) section 120, which imposes a delayed compliance penalty on sources, and is computed by reference to the sources' pollution control costs saved as a result of the delayed compliance; and (ii) section 405(a), which directs a study on economic regulatory methods, including emission fees, by EPA and Council of Economic Advisors. Rep. Wirth, the author of this study provision, stated that the study provision has—

> great promise for improving our future efforts to control air pollution * * * [The provision] directs the Councils on Environmental Quality to study the effectiveness of using economic incentives to supplement our regulatory approach to pollution control. * * * [A]fter we look at the effect of [an early House version of the delayed compliance penalty provisions that would have determined the penalty by reference to amounts of emissions], and the results of the study * * * we should have enough evidence to adopt a comprehensive program of economic controls * * *.[4]

These aspects of the legislative history may be interpreted to indicate that Congress, in adopting the CAA Amendments of 1977, did not believe that the concept of economic regulations, particularly emission fees, was sufficiently well developed at that time to be adopted.

However, EPA seeks comment on the extent to which Congress's concerns about economic controls primarily focused on using economic controls, in particular, emission fees, as the principal means of regulating pollutants that were already regulated under the 1970 Clean Air Act. Under this interpretation of the legislative history, Congress was primarily concerned about regulating pollution solely through emission fees; *i.e.*, allowing sources to emit as much pollution as they were willing to pay for. Under this interpretation, Congress was concerned that these types of emission fees (i) may not guarantee a particular level of pollution control (because, for example, if the fees were set too low, sources would emit more pollution than anticipated), (ii) could be administratively complex, and (iii) could have unforeseen economic effects on the industry.[5] It could be argued that at least some of these concern may not apply to CFC charges under either the fee system or the auction system described in this notice. For example, it could be argued that the CFC charges described in this notice would not jeopardize attainment of a particular level of pollution control because the amount of CFCs that may be produced

[3] Under 31 U.S.C. 3302(b), the funds collected through the CFC charges would go to the U.S. Treasury.

[4] Legislative History, at 6382.

[5] For example, Senator Muskie, one of the architects of the 1977 Clean Air Act Amendments, raised these concerns during a September 18, 1975 mark-up session held by the Subcommittee on Environmental Pollution, Committe on Public Works, concerning a proposal by Senator Buckley to impose an emission fee on emissions of sulfur dioxide.

and consumed would be limited separately. That is, CFC fees would simply supplement the allocated quota system. Similarly, an auction would simply be a method of distributing the allowable amount of CFC production and consumption rights.

TSCA Sec. 6(a)(5) is also written broadly—"prohibiting or otherwise regulating any manner or method of commercial use of such substance. . . ." EPA solicits comments on the extent to which these provisions may be broad enough by their terms to permit CFC charges. As discussed above, the legislative history of TSCA reveals specific congressional concern over monopoly profits that could result from EPA action to restrict supply of a substance. However, this legislative history seemed to result from earlier proposals to require EPA to impose specific allocations of quotas, under certain circumstances, if EPA limited production or use of a product. This legislative history does not explicitly authorize action, such as fees, to eliminate monopoly profits.

One commenter (federal agency) argued that EPA also had authority under the IOAA to impose CFC charges on the grounds that the IOAA authorizes fees in an amount up to the value of the benefit provided the recipient. This commenter stressed that in *NCTA*, the Supreme Court held that IOAA fees should be computed with reference to "value" granted by the agency to the recipient, and did not expressly limit the amount of fees to the agency costs in providing the benefit. The commenter acknowledged that at least four Federal Courts of Appeals, in at least eight decisions, following *NCTA* have stated that the IOAA limits fees to agency costs (or value provided the recipient, if lesser).[6] However, the commenter indicated that these statements were not relevant to the holdings of those cases. EPA invites further public comment on this issue, including on how clearly the appellate courts have spoken.

On a broader level, EPA seeks comments on whether interpreting the CAA, TSCA or the IOAA to permit EPA to charge CFC fees could result in interpreting these and perhaps other statutes to permit EPA and other agencies to impose other charges that could cumulate in substantial revenues. The potential significance of administrative agencies' collecting substantial revenues may be a factor in interpreting the statutes to allow this action.

C. Public Comment

The legal issues outlined above raise questions about the best way to proceed with the proposal for CFC charges. CFC charges will be more effective if imposed in the near future because even one or two years of windfall profits accruing to the current CFC producers could delay the introduction of substitutes, with detrimental results. If EPA imposed a fee in conjunction with allocated quotas, United States compliance with the Montreal Protocol would not be in jeopardy even if the regulatory fee were legally challenged. However, if EPA were to impose fees, a court were to invalide them, and Congress were then to impose them, the loss of time before the fees became effective could reduce their utility. Accordingly, EPA seeks comment on the overall extent of the legal risks noted above with respect to CFC fees, and the best course to follow in light of the risks.

Similarly, if a court invalidates the auction, the United States' compliance with the Montreal Protocol would be jeopardized. Thus, EPA seeks comment on the overall extent of the legal risks concerning an auction, and the best course to follow in light of the risks.

VI. Direct Controls on Use of CFC and Halons

In the December 14 proposed rule, the Agency described the possible need to develop a program of engineering controls or bans on CFC and halons, either alone or as a supplement to the allocated quotas, if users of these chemicals were postponing the adoption of technologically available, low-cost reductions. The central purpose of direct controls is to ensure that low-cost reductions would be made in a timely manner, thus preventing unwarranted price increases for the uncontrolled substances.

EPA received 48 comments addressing the issue of direct controls. Thirty commenters opposed the adoption of any technology-based controls or bans. Generally, these comments cited as the major disadvantages of direct controls, the elimination of incentives to develop substitutes and innovative practices, the likelihood of high administrative and compliance costs, the uncertain level of environmental protection, and economic inefficiency as a result of inflexibility and unresponsiveness to changing technological innovations and economic conditions.

In contrast, eighteen commenters favored engineering controls and bans for some CFC and halon applications, because they believe that despite CFC price increases, voluntary and timely reductions by industry are unlikely in the near term. Seven commenters preferred that industry-specific engineering controls or bans be imposed in conjunction with allocated quotas. One commenter believed that such a "hybrid" would protect foam-blowing applications, an end use where near-term substitutes may not be readily available, from having to bear excesssive CFC price increases.

For many of the reasons outlined in these comments, EPA did not promulgate direct controls in the final rule published elsewhere in today's **Federal Register**. However, the Agency believes that direct controls, when used in conjunction with the allocated quota system, under certain conditions (e.g., to overcome market imperfections) offer a potential cost-saving to allocated quotas.

While the allocated quota system, by itself, requires that the Protocol's mandated reductions in CFCs and halons occur and thus fully implements the requirements of the Montreal Protocol, the addition of a program of direct controls would ensure that low-cost reductions are adopted.

Potential disadvantages of direct regulations, such as high compliance and administrative costs, depend on the type of controls adopted. For example, a ban of CFCs in some end use applications would be simple to administer and enforce. EPA also believes that innovative technologies would develop if prospective bans were imposed in conjunction with allocated quotas and that it is possible to design such regulations for select user groups that would minimize the disadvantages of this traditional regulatory approach. Several other nations (e.g., Canada, Japan, and Sweden) are considering this form of hybrid approach for their implementation of the Montreal Protocol.

A. Need for Direct Controls

As part of its revised RIA, EPA examined the potential impact of delayed efforts by user industries to adopt low-cost reduction technologies in a timely manner. This analysis compared two scenarios. The Case 1 scenario assumed key user industries

[6] The commentator cited the following decisions: *Central & Southern Motor Freight Tariff Ass'n* v. *United States*, 777 F.2d 722, 729 (D.C. Cir. 1985); *Nevada Power Co.* v. *Watt*, 711 F.2d 913, 933 (10th Cir. 1983); *Yosemite Park and Curry Co.* v. *United States*, 686 F.2d 925, 931 (Ct. Cl.1982); *Mississippi Power & Light* v. *NRC*, 601 F.2d 223, 230 (5th Cir. 1979), *cert. denied*, 444 U.S. 1102 (1980); *National Cable Television Ass'n* v. *United States*, 554 F.2d 1094, 1106–07 (D.C. Cir. 1976); *Electronic Industries Ass'n* v. *FCC*, 554 F.2d 1109, 1114–15 (D.C. Cir. 1976); *National Ass'n of Broadcasters* v. *FCC*, 554 F.2d 1118, 1128 (D.C. Cir. 1976); *Capitol Cities Communications, Inc.* v. *FCC*, 554 F.2d 1135, 1138 (D.C. Cir 1976).

delayed the date at which they began shifting away from CFCs and that a lower percentage of firms in a user industry made the shift over a longer period of time. The Case 2 scenario assumes exactly the opposite; firms aggressively move away from CFCs to alternative technologies and increased recycling and recovery. Tables 2 and 3 show the user industries examined in this analysis and the assumptions used in the Case 1 and 2 scenarios, respectively. These assumptions were entered into the Integrated Assessment Model (IAM) used in the RIA. This model determines likely CFC price effects based on assumptions concerning control options and actions by industries.

TABLE 2.—CASE 1 ASSUMPTIONS ABOUT TECHNICAL FEASIBILITY OF CFC-CONSERVING TECHNOLOGIES

Sector/technology	Start date [a]	Penetration time [b]	Use-specific reduction potential in 1988 [c]
Mobile Air Conditioning:			
Recovery at Service-Large Shops	1989	3	8.5%
Recovery at Service-Medium Shops	(*)	(*)	(*)
Recovery at Service-Small Shops	(*)	(*)	(*)
DME	(*)	(*)	(*)
Solvents:			
Terpenes and Aqueous Cleaning	1988	5	24%
CFC-113 Azeotropes	1989	4	[d] 7%
Housekeeping	1989	1	[f] 5–12%
HCFC-123	(*)	(*)	(*)
Hospital Sterilization:			
Disposables	1988	9	22%
Alternate Blends	1988	5	7%
Contracting Out	1989	9	4%
Steam Cleaning	(*)	(*)	(*)
Refrigeration:			
Recovery at Service	1988	5	3–11%
Recovery at Rework	1988	3	2%
FC-134a	1992	[f] 10–21	[f] 5–53%
Foam Insulation:			
Product Substitutes	1990	[f] 5–10	[f] 20–40%
HCFC-123	1992	3	[f] 27–50%
HCFC-141b	1991	3	[f] 30–50%
Flexible Foam-Molded:			
Water-Blown Processes	1988	3	41%
HCFC-141b	1991	9	18%
Flexible Foam-Slabstock:			
HCFC-123	1992	9	26%
HCFC-141b	1991	9	18%
Foam Packaging:			
Product Substitutes	1988	[f] 3–5	[f] 10–51%
HCFC-22	1988	2	[f] 0–90%
Aerosols:			
Carbon Dioxide	1988	4	25%
HCFC-22 Blends	1988	4	25%

NOTES:
[a] Year in which technology initially becomes available for commercial use.
[b] Years until maximum use of technology is achieved.
[c] Possible reduction in CFC use for the sector in 1998 for this control only. Some technologies can only control a small percentage of an application's use. Thus, a number smaller than 100% may not indicate low penetration but may indicate that the control can only eliminate a small percentage of the application's use.
[d] Case 1 assumes that no CFC reductions are possible through this technology.
[e] Azeotrope consists of 70 percent CFC-113. The reduction shown reflects the 30 percent reduction in CFC-113 achieved when using the azeotrope and the fraction of the solvent sector adopting the azeotropes.
[f] Ranges reflect differences in assumptions about technical feasibility of adopting technology by subsectors within this sector (e.g., in some subsectors the reductions are lower than others). Within particular subsectors, the reductions do not exceed 100 percent.

TABLE 3.—CASE 2 ASSUMPTIONS ABOUT TECHNICAL FEASIBILITY OF CFC-CONSERVING TECHNOLOGIES

Sector/technology	Start date [a]	Penetration time [b]	Use-specific reduction potential in 1988 [c]
Mobile Air Conditioning:			
Recovery at Service-Large Shops	1989	3	8.5%
Recovery at Service-Medium Shops	1989	3	19.2%
Recovery at Service-Small Shops	1989	3	7%
DME	1989	3	20%
Solvents:			
Terpenes and Aqueous Cleaning	1988	5	50%
CFC-113 Azeotropes	1989	4	12% [d]
Housekeeping	1989	1	14%
HCFC-123	1992	10	3%
Hospital Sterilization:			
Disposables	1988	5	35%
Alternate Blends	1988	5	35%
Contracting Out	1988	9	5%
Steam Cleaning	1988	1	10%
Refrigeration:			
Recovery at Service	1988	4–9 [e]	6–27% [e]
Recovery at Rework	1988	2	2%
FC-134a	1992	10–21 [e]	50–100% [e]
Foam Insulation:			
Product Substitutes	1990	5	10–80% [e]
HCFC-123	1992	3	17–50% [e]
HCFC-141b	1991	3	20–50% [e]

TABLE 2.—CASE 1 ASSUMPTIONS ABOUT TECHNICAL FEASIBILITY OF CFC-CONSERVING TECHNOLOGIES—Continued

Sector/technology	Start date [a]	Penetration time [b]	Use-specific reduction potential in 1988 [c]
HCFC-22 Blends	1988	2	25%

NOTES:
[a] Year in which technology initially becomes available for commercial use.
[b] Years until maximum use of technology is achieved.
[c] Possible reduction in CFC use for the sector in 1998 for this control only. Some technologies can only control a small percentage of an application's use. Thus, a number smaller than 100% may not indicate low penetration but may indicate that the control can only eliminate a small percentage of the application's use.
[d] Case 1 assumes that no CFC reductions are possible through this technology.
[e] Azeotrope consists of 70 percent CFC-113. The reduction shown reflects the 30 percent reduction in CFC-113 achieved when using the azeotrope and the fraction of the solvent sector adopting the azeotropes.
[f] Ranges reflect differences in assumptions about technical feasibility of adopting technology by subsectors within this sector (e.g., in some subsectors the reductions are lower than others). Within particular subsectors, the reductions do not exceed 100 percent.

TABLE 3.—CASE 2 ASSUMPTIONS ABOUT TECHNICAL FEASIBILITY OF CFC-CONSERVING TECHNOLOGIES—Continued

Sector/technology	Start date [a]	Penetration time [b]	Use-specific reduction potential in 1988 [c]
Flexible Foam-Molded:			
Water-Blown Processes	1988	1	53%
HCFC-141b	1991	9	35%
Flexible Foam-Slabstock:			
HCFC-123	1992	8	24%
HCFC-141b	1991	9	40%
Foam Packaging:			
Product Substitutes	1988	3–5 [e]	20–60% [e]
HCFC-22	1988	2	5–80%
Aerosols:			
Carbon Dioxide	1988	4	50%
HCFC-22 Blends	1988	4	50%

NOTES: [a] Year in which technology initially becomes available for commercial use.
[b] Years until maximum use of technology is achieved.
[c] Possible reduction potential for response action in 1998 for this control only. Some technologies can only control a small percentage of an applications use. Thus a number smaller than 100% may not indicate low penetration but may indicate that the control can only eliminate a small percentage of the applications use.
[d] Azeotrope consists of 70 percent CFC-113. The reduction shown reflects the 30 percent reduction in CFC-113 achieved when using the azeotrope and the fraction of the solvent sector adopting the azeotropes.
[e] Ranges reflect differences in assumptions about technical feasibility of adopting technology by subsectors within this subsector (e.g., in some subsectors the reductions are lower than others). Within particular subsectors, the reductions do not exceed 100 percent.

Table 1 presented earlier shows the economic impact of delays in implementing low-cost reduction technologies. It shows that substantial increases in total costs (from just over $1 billion in Case 2 to almost $3 billion in Case 1 through the turn of the century) would result. It also shows that windfall profits (pre-tax) through the year 2000 would as much as triple, going from just under $2 billion in Case 2 to over $7 billion in Case 1. CFC prices would shift from no increase in the initial years under the Case 2 scenario to price increases of $5–6.00/kg in the early years under the Case 1 scenario.

Based on this analysis, it appears that control actions in the next few years will have a substantial impact on short-term costs of reducing use of CFCs and halons, but far less impact on longer-term costs. However, short-term price effects are critical to encouraging an orderly transition away from these chemicals with minimum disruption to the nation's economy, and in avoiding adverse environmental consequences discussed above.

The extent to which near-term price increases can be minimized is also

crucial to the ability of potentially vulnerable industrial users of CFCs (e.g., certain foam applications) to maintain their markets prior to the availability of chemical substitutes. If these firms are not confronted with steep near-term price increases, they will be better able to continue manufacturing until chemical substances become available.

B. Criteria for Selecting Direct Controls

The December 14 proposal outlined several criteria EPA may use to develop possible controls. First, the Agency would review low-cost reductions currently available within each user group. It is these reductions that EPA believes that industry will or should undertake during the initial years of the allocated quota system. For some end use applications, low-cost options may not currently be available; for others, control options are currently available but may not be implemented due to the small cost of CFCs relative to the total cost of the product or due to the ability to pass higher costs on to consumers. EPA intends to closely monitor the pace at which reductions are being made and if necessary develop control requirements. EPA is requesting comment on the level of reduction in CFC and halon use or rate of progress toward substitutes which EPA should expect within these industries to indicate each industry's commitment to reduction in use of these chemicals.

Second, the Agency will be concerned with the administrative burden associated with monitoring compliance and enforcing its regulations. EPA may target end use applications where volumes of CFCs and halons consumed are easily monitored or where uses can be banned, rather than mandating tecnology-based controls which generally require extensive compliance with monitoring and site inspections by EPA inspectors.

Finally, EPA will avoid, if possible, direct regulations on small businesses. The Agency believes that the small business community should not bear an inordinate burden relative to larger businesses to comply with the stratospheric ozone program. Furthermore, it is much more likely that small business will undertake measures to reduce their use of controlled substances since they will be unable to absorb large increases in the price of CFCs and halons. The large number of small businesses potentially regulated also presents compliance monitoring and enforcement problems.

EPA will closely monitor industry responses to today's final rule and review the development of reductions in CFC and halon uses over the coming years. EPA believes that if reductions do occur then subsequent price increases of controlled substances will be moderate. If available reductions are not adopted, however, and prices increase significantly, this would signal the need for direct controls on user applications. EPA is also seeking public comment on the possible role of voluntary, as opposed to mandatory controls, and the potential to use some form of negotiated rulemaking process with specific user groups.

C. Potential Near-Term User Regulations

Based on the analysis contained in its RIA and the criteria described above, EPA has identified several industry sectors where direct regulation in the near term may be appropriate. To understand the impact of controls implemented within individual sectors, EPA estimated, through the IAM model, price increases of controlled chemicals when an individual sector alone adopts low-cost controls. In some instances, sectors which use a relatively small percentage of the total of controlled substances can prevent large price increases if controls can either substantially eliminate CFC use in the sector or can be used by a high percentage of firms in that sector. In contrast, CFC price impacts from controls in a larger CFC user sector may not be as great due to limited market penetration.

1. Automobile Air Conditioning

Approximately 25 percent of all domestically-consumed CFCs are currently used in auto air conditioners, making it the single largest use of these chemicals. Moreover, current servicing practices result in substantial unnecessary emissions of CFC–12. Typically, any CFC–12 remaining in the auto air conditioner is first vented to the air, a new charge of CFC–12 is sometimes used to test the system and to locate the leak, and finally the system is recharged. Additional waste may occur when "do-it-yourselfers" either charge systems repeatedly what repairing the levels, overcharge systems, or discharge unused chemical from the small cans used to recharge systems.

Several groups (automobile manufacturers, servicing trade associations and recycling equipment manufacturers) are not working together to develop a standard for recycling CFC–12 for car air conditioners. If this step alone were taken, the resulting reductions in CFC demand would reduce the price of CFCs in 1989 from $6.69/kg in the Case 1 scenario to $4.49/kg. Because of the importance of this step, EPA intends to closely monitor progress toward recycling by this industry segment and intends to develop mandatory regulations requiring recycling in all service shops by 1992 if near-term progress toward the use of recycling in this industry segment does not occur.

In addition, DME/12 blend, a mixture of CFC–12 and dimethylether, is a potential "drop-in" replacement for CFC–12, and has considerably lower ozone-depleting potential than CFC–12. Assuming the additional tests of this blend that are underway prove that it can safely be used in existing auto air conditioning systems, EPA believes that automobile manufacturers and service repairmen could replace CFC–12 with the DME/12 blend during initial charging and future servicing. EPA estimates that the DME/12 blend could replace 20 to 30 percent of CFC–12 used in these applications if such a practice is accepted under the automobile warranties which currently require pure CFC–12 as the replacement refrigerant. If adopted, DME/12 blend could reduce price increases from $6.69 per kilogram in Case 1 to $2.21 per kilogram.

2. Hospital Sterilization

Hospital sterilization accounts for 4 percent of all CFCs used within the United States. Although this application consumes a small percentage relative to other uses, there are several immediate opportunities to decrease its use of CFC–12. To minimize CFC price increases, hospitals could expand their use of disposable medical items, potentially displacing 45 percent of CFC–12 used for sterilization. Hospitals could also contract to have sterilization done by external facilities which would use less CFC–12 in total than individual hospitals, saving approximately 5 percent of CFC–12 currently used in this application. Finally, alternate blends of chemicals and steam cleaning could together displace an additional 45 percent of CFC–12 used within this application.

There are several obstacles to the adoption of these technologies. Acceptance by hospital administrators, physicians and staff who may be biased toward more traditional means of sterilization is crucial. Further development of off-site sterilization facilities and disposable instruments are also necessary. Finally, any new sterilants must be submitted to and approved by EPA under the Federal Insecticide, Fungicide, and Rodenticide Act. If these alternatives were available and implemented in 1988, price increases could be reduced from $6.69

per kilogram to $2.21 per kilogram in 1989. Due to this potential saving for a relatively small user groups, EPA intends to monitor this user industry and require a ban of CFC–12 use in hospital sterilization if expected reductions do not occur.

3. Aerosols

Current uses of CFCs in aerosols were exempted from the 1978 aerosol ban and account for approximately five percent of the total CFC usage in the United States. Several alternative aerosol propellants and alternative delivery systems have been developed since the original aerosol exemptions were granted. A complete ban of CFCs within aerosols would reduce the price increase in 1989 from $6.69 per kilogram in Case 1 to $2.79 per kilogram. EPA may propose product labeling and further restrictions on aerosol use.

4. Solvents

Approximately 12 percent of all domestically consumed CFCs are used in solvent cleaning of metal and electronic parts. This area also has several potential alternatives or process modifications to minimize the use and thus the demand for CFC–113. The use of terpene and aqueous cleaning as substitutes for CFC–113 based solvents can provide approximately a 50 percent reduction in CFC–113 within this application by 1998. The timely application of CFC–113 azeotropes or mixtures and improved housekeeping practices to minimize vent losses or spills could further reduce CFC demand by an additional 20 percent. If all controls are adopted, the expected price rise is only $1.95 per kilogram, rather than $6.69 under the "Case 1" scenario. EPA recognizes however that solvent applications are difficult to characterize and that not all uses could shift to the suggested alternatives. While several large firms have recently made substantial strides toward reducing their reliance on CFCs, EPA will closely monitor this industry to determine if direct regulations are required and to better define which applications should be controlled.

D. Potential Long-Term Reductions and Controls

1. Commercial Air Conditioning

The December 14 proposal described several trends within the commercial air conditioning sector away from the controlled substances. Commercial chillers have already begun to shift to HCFC–22, CFC–502 and CFC–500, which are chemicals and mixes with ozone depletion weights that are significantly lower than CFC–11 and CFC–12. CFC recovery during routine maintenance would further reduce CFC emissions. Recovery of refrigerant during maintenance is not currently standard industry practice. Regulations requiring recovery may be necessary to ensure low cost reductions are made as CFC prices increase. For the future, alternative chemicals such as HCFC–134a, HCFC–123, DME/CFC–12 or HCFC–22/142b may replace CFC–11 and CFC–12 in new equipment.

2. Automobile Air Conditioning

Over the long term, EPA believes that the automobile manufacturers will have several chemical substitutes available. One promising alternative is HFC–134a, a chemical that the major automobile manufacturers, in their comments, pointed to as the most likely substitute, but one that will require several years to develop, test and begin integrating into the automobile fleet. However, other chemicals are also under active consideration worldwide. Finally, as discussed above, a blend of dimethylether and CFC–12 may be another possible alternative to pure CFC–12 refrigerant in existing and new equipment.

Although future automobile air conditioners may contain HFC–134a or some other refrigerant, the existing fleet of automobiles will continue to consume CFC–12. Venting during repair and losses due to refrigerant trapped within discarded containers contribute to large emissions of CFCs when eventually released. As mentioned earlier, EPA is investigating the possibility of requiring recycling at time of servicing and the use of a DME/CFC–12 blend as replacement coolant.

3. Electronics and Metal Cleaning

The electronic industry uses CFC–113 as a solvent; its use has grown substantially over the past years due to health concerns about alternative chlorinated solvents. The December 14 proposal noted that the high cost of CFC–113 and the fact that it is recoverable makes it economically attractive to recover and recycle CFC–113. For the same reason, EPA believes recovery and recycling are possible candidates for mandated controls. Existing equipment frequently does not have automatic covers or hoists (in the case of open top vapor degreasers) to reduce losses. Better operating practices or "housekeeping" could further reduce CFC losses. As mentioned above, alternatives such as aqueous cleaners or terpenes, are likely to play a large role in reducing this user group's dependence on CFC–113 and other chlorinated solvents. EPA expressly does not view shifting from CFC–113 to other chlorinated solvents which are currently under regulatory scrutiny as an acceptable solution to protecting the ozone layer.

Several commenters questioned EPA's previous estimates that aqueous cleaning would replace a large share of CFC–113 use. EPA does estimate that 50 percent of CFC–113 will be replaced by both aqueous and terpene-based solutions. Commenters believed that the diversity of the electronics manufacturing industry makes it necessary to examine the suitability of these substitutes on a case-by-case basis and that across the board recommendations or controls are not possible.

EPA recognizes the diverse nature of the electronics industry and will account for this diversity should direct controls be considered.

4. Flexible Foam

EPA discussed in the December 14 proposal possible controls applicable to the flexible foam industry, including makers of polyurethane foam slabstock. CFC–11 is an auxiliary blowing agent used by slabstock makers who manufacture cushions, mattresses and bedding. At this time, no chemical substitutes are currently available, but EPA believes that flexible foam-blowers may manufacture slabstock without CFCs. The elimination of the auxiliary blowing agent would result in firmer, higher density foam cushions for automobile seats. Over the longer term, modified polyols may be used to decrease foam densitiy to provide a softer foam simlar to CFC–11 blown foam. In addition, foam-blowers may increase water content of the foam to reduce density. In the long term, HCFC–123 or another chemical substitute may become a viable replacement for CFC–11 in many foam applications.

In response to EPA's discussion in the proposal, several automobile manufacturers indicated that efforts to replace CFC–11 in molded flexible foam seats for automobiles have been fairly successful, and that water-blown technologies can create the proper foam densities. Given the success with automobile cushioned seats, a ban of CFC–11 within this application may be appropriate.

5. Commercial and Residential Refrigeration

Like commercial air conditioning, commercial refrigeration is shifting toward other less ozone-depleting chemicals such as HCFC–22, CFC–502

and CFC–500. Manufacturers can also reduce emissions through alternate leak testing and recovery of CFC–12 during rework of the unit during test runs in the factory. Over the long term, HFC–134a or some other chemical substitute may replace CFC–12 in new equipment. A wide range of alternative refrigerants are also being explored for residential refrigerators.

Twenty commenters claimed that there were no currently available alternatives to CFC–11, 12 and 502. Industry also believes that the adoption of HFC–134a as a future alternative chemical will require large capital costs as factories retool to produce new refrigeration units. EPA is currently reviewing the possibility of HCFC–22, dimethylether/CFC–12, and HCFC–22/142b as substitutes for these end use applications. In the near term, increased use of recovery and recycling of refrigerant during servicing and use of DME/12 blend may be the most attractive options. Over the longer term, new refrigerants which reduce dependence on CFCs without sacrificing energy efficiency will represent the most acceptable market solutions.

6. Rigid Insulating Foams

CFC–11 is used as a blowing agent to make various forms of insulating foams such as polyurethane, isocyanurate, and phenolic foams. In the short term, HCFC–22 can be used in polystyrene insulation, and blends may be developed which reduce use of CFC–11, but there are no commonly accepted chemical substitutes for other rigid foams. There are possibilities that product substitutes may attract part of the insulation market from this end use application. Over the long term, HCFC–123 or HCFC–141b may become an attractive means of reducing this use of CFC–11.

7. Rigid Packaging Foams

Polystyrene foam is widely used in the food packaging industry. CFC–12 is primarily used as a blowing agent and currently competes with pentane. In contrast to pentane, which is flammable and contributes to air pollution, HCFC–22 may be a more suitable substitute for CFC–12. The Food and Drug Administration has recently approved the use of HCFC–22 in food service applications. The most comprehensive data on HCFC–22 for polystyrene foam suggests that firms will incur only limited capital costs and that operating costs are not expected to increase with the adoption of HCFC–22. In response to the development of this alternative, the industry has proposed to phase-out voluntarily the use of CFC–12 in food packaging by December 31, 1988.

8. Total Flooding Fire Extinguishant Systems

Halon 1301 is used as the agent in total flooding fire extinguishant systems to protect computer centers, document rooms, libraries, military installation, etc. Due to its unique features (non-toxic, non-residue forming), there are currently no available substitutes.

EPA believes that in the short term voluntary reduction will occur within the industry to reduce unnecessary emissions. Discharge testing of new systems using halons is being reduced or even eliminated as alternative test gases are being developed and employed. EPA's analysis of halon emission patterns indicate that only approximately 25 percent of all halon emissions are emitted to fight an actual fire. All other emissions are a result of accidental discharges, training procedures, and system and discharge testing.

Research efforts must focus on better ways to design systems which require less agent for the required protection, on appropriate methods for determining when halon protection is in fact necessary, and on the development of chemical substitutes.

9. Halon Fire Extinguishers

Halon 1211 is used extensively in portable fire extinguishers in markets where concerns exist about human exposure to and harm from residues from other agents. In addition to this market, portable fire extinguishers have penetrated consumer markets and some percentage are now purchased and used for applications where other fire extinguishing agents would be suitable.

EPA is currently considering restricting the sale of portable halon extinguishers for home use. Small halon extinguishers are relatively inexpensive and are purchased even where other agents might be used. Mandated controls could limit the sale of extinguishers in markets where substitutes are readily available.

10. Sterilization

The December 14 proposal outlined several available ways of reducing the use of CFC–12 to sterilize medical equipment. These options include the use of mixtures of carbon dioxide and ethylene oxide, cobalt radiation, and recovery of CFC–12 with carbon adsorption and refrigerated condensers. Several commenters on the December 14 proposal disagreed that these options are available, stating that no widely available means of reducing CFC–12 use are as safe or effective as the ethylene oxide and CFC–12 mixture.

EPA continues to believe that the options are commercially available and have been successfully demonstrated in the United States. Two of the methods, cobalt and gamma irradiation of equipment, have proven successful and indicate potential for future growth. The carbon dioxide and ethylene oxide mixture may require chamber replacement, and pure ethylene oxide for sterilization will require an explosion proof chamber, but over a long time period it may be cost-effective for commercial sterilizers and large hospitals to switch to these alternatives. For these reasons, EPA believes that sterilization end use application may be a likely candidate for direct controls.

E. Barriers to Reducing CFC and Halon Use

EPA is also seeking public comment on specific institutional barriers to reducing the use of CFCs and halons. Several commenters expressed concerns that such factors as energy efficiency standards, purchasing specifications, conflicting environmental laws and regulations, states and local codes, industry warranties, etc., may impede progress in moving away from ozone-depleting chemicals.

EPA has initiated or is participating in studies in several of these areas to determine what steps are necessary to reconcile potentially conflicting goals and to remove needless institutional barriers. EPA welcomes additional comment on relevant aspects of this issue.

F. Labelling

In addition to the allocated quota system, auctions, and direct controls for specified user industries, EPA is also considering labelling requirements for products containing or manufactured with CFCs. As discussed in the December 14 proposal, EPA believes labelling provides useful information to consumers, increasing their awareness of the ozone issue and allowing the public to make informed decisions on purchases. In turn, a change in demand will assist the industry in moving toward alternatives. Indeed, EPA believes labelling was an effective impetus in moving industry away from CFC use before the 1978 aerosol ban and has been proposed by several other nations (e.g. Canada and European Economic Community) as part of their plans to implement the Montreal Protocol.

Ten commenters believed that labelling could be an important part of

the final EPA regulation, providing consumers with information that will allow them to make choices which protect the ozone layer, helping to prevent the misuse of CFC and halon products, and providing a marketplace incentive for manufacturers either to implement promptly a substitute for CFCs or to alter their products to eliminate CFCs.

Seventy-four commenters opposed a labelling requirement, believing that labelling would adversely affect their business. Commenters stated that labelling could cause consumer panic and affect industry's research and development efforts. User groups believe that labelling will drive up the cost of products, and adversely affect firms where chemical substitutes are not available.

Currently, EPA has not fully investigated the potential costs and benefits of labelling in either general or specific applications of the requirement. EPA intends to further investigate the need for and potential role of labelling and requests additional comments on this possible future requirement.

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